

# Cisco IOS XE Software for Cisco ASR 920 Series Aggregation Services Routers

Cisco IOS<sup>®</sup> Software is continuously evolving to provide you with the features of higher quality. Cisco IOS<sup>®</sup> Software software provides modular structure for Cisco ASR920 Series Aggregation Services Routers which allows separation of the data plane and the control plane thereby enhancing the performance of the system.

Cisco IOS XE Software on the Cisco ASR 920 Router (Figure 1) includes licenses for Metro Access, Metro IP Access, and Advanced Metro IP access. These feature sets can be activated as needed, allowing “pay as you grow” model.

**Figure 1.** Cisco ASR 920 Router



## Software Releases and Options

Cisco IOS XE Software for ASR 920 routers provides modular packaging, so you can buy just the software features you need. And as with all Cisco IOS Software, the code is divided into separate modules, so you can update them separately to get new features more quickly. Cisco IOS XE Software also provides powerful resiliency. ASR 920 routers are supported as of Cisco IOS XE Software Release 3.13.0S.

## Consolidated Software Packages

Consolidated software packages contain a superset of all features. The individual feature sets can be activated once the correct feature licenses are applied to the router. Table 1 describes the two Cisco IOS XE universal consolidated packages supported on the ASR 920 Router and the functionality supported in this universal image. The functionality is enforced through the appropriate technology package licenses.

**Table 1.** Universal Cisco IOS XE Software Consolidated Package for Cisco ASR 920 Routers

Cisco IOS XE Consolidated Package	Part Number	Description
<b>Cisco ASR 920 Series IOS XE - No Payload Encryption</b>	SASR920NPEK9S	<ul style="list-style-type: none"> <li>Provides a consolidated package</li> <li>Offers basic feature support without a license, including Secure Shell (SSH) and SNMPv3 support</li> </ul>

## Flexible Software Activation

Cisco ASR 920 routers support the Cisco IOS software activation feature. With this capability, Cisco IOS Software feature sets can be activated with software licenses, supporting an “pay as you grow” model. This model allows service providers to invest in software resources only when their businesses need them. All software licenses for Cisco ASR 920 routers are available on a per-chassis basis. ASR 920 routers offer three Cisco IOS Software licenses:

- **Metro Access License:** Offers advanced quality of service (QoS), Carrier Ethernet Layer 2 features, Synchronous Ethernet (SyncE), and Ethernet operations, administration, and maintenance (OAM) capabilities.
- **Metro IP Access License:** Offers all capabilities of the Metro Access license with the addition of IEEE 1588-2008 Ordinary Clock and Transparent Clock, Bidirectional Forwarding Detection (BFD), Layer 3 features for advanced IP routing protocols, multi-VPN routing, and Layer 3 Multicast and Forwarding Customer Edge (multi-VRF CE) capabilities.
- **Advanced Metro IP Access License:** Adds the following capabilities to the Metro IP Services license: Multiprotocol Label Switching Transport Profile (MPLS-TP); MPLS, Ethernet over MPLS (EoMPLS), Circuit Emulation Service over Packet Switched Network (CESoPSN), and Structure Agnostic TDM over Packet (SAToP) pseudowires; Multirouter Automatic Protection Switching (MR-APS); Multichassis Link Aggregation and Control Protocol (mLACP); MPLS traffic engineering (MPLS TE); MPLS Fast Reroute (MPLS FRR); and MPLS VPN support.

Table 2 lists the main features in the Cisco IOS Software licenses for ASR 920 routers. Feature availability is dependent on software release and implementation schedule.

**Table 2.** Feature Sets in Cisco ASR 920 Router Licenses

Features	Metro Access License	Metro IP Access License	Advanced Metro IP Access License
QoS, with deep buffers and hierarchical QoS (HQoS)	√	√	√
Layer 2: 802.1d and 802.1q	√	√	√
Ethernet Virtual Circuit (EVC)	√	√	√
Ethernet OAM (802.1ag and 802.3ah)	√	√	√
Multiple Spanning Tree (MST) and Resilient Ethernet Protocol (REP)	√	√	√
Synchronous Ethernet	√	√	√
IPv4 and IPv6 host connectivity	√	√	√
IP routing (Routing Information Protocol [RIP], Open Shortest Path First [OSPF], Enhanced Interior Gateway Routing Protocol [EIGRP], Border Gateway Protocol [BGP], and Intermediate System-to-Intermediate System [IS-IS])		√	√
Protocol-independent multicast (PIM) (sparse mode [SM], dense mode [DM], source-specific multicast [SSM]), SSM mapping		√	√
BFD		√	√
Multi-VRF CE (VRF lite) with service awareness (Address Resolution Protocol [ARP], ping, Simple Network Management Protocol [SNMP], syslog, trace-route, File Transfer Protocol [FTP], and Trivial File Transfer Protocol [TFTP])		√	√
IEEE 1588-2008 Ordinary Clock and Transparent Clock		√	√
MPLS (Label Distribution Protocol [LDP] and VPN)			√
MPLS TE and fast reroute (FRR)			√
MPLS OAM			√

Features	Metro Access License	Metro IP Access License	Advanced Metro IP Access License
MPLS-TP			√
Pseudowire emulation (EoMPLS, CESoPSN, and SAToP)			√
Virtual Private LAN Service (VPLS) and Hierarchical VPLS (HVPLS)			√
Pseudowire redundancy			√

## Additional Feature Licenses

The following two additional Cisco IOS licenses are used to activate new software functionality for Cisco ASR 920 routers, in addition to feature set capabilities.

- **OC3 port license:** Allows service providers to activate OC3 ports on the Cisco ASR 920 router, One license is required for each OC3 port. The A900-IMA4OS IM supports four OC3 ports.
- **IEEE 1588-2008 BC/MC license:** Allows service providers to activate IEEE 1588-2008 Boundary Clock (BC) or Master Clock (MC), or both, when required. One license is required for each chassis that needs to activate IEEE 1588-2008 BC or MC functionality in the system.

## Cisco IOS XE Release Schedule

The Cisco IOS XE software delivery schedule allows customers to qualify releases more quickly and have a definitive release schedule for new software images. This schedule includes:

- **Time-based releases:** Releases are planned for delivery every four months. New software features and hardware are introduced in each release. Releases have fewer incremental features included when compared with traditional Cisco IOS Software releases, reducing customer qualification time.
- **Two release support durations:** Each Cisco IOS XE Software release is classified as either a Standard Support or Extended Support release. A Standard Support release has a total engineering support lifetime of one year, with two scheduled rebuilds. The Extended Support release provides a total engineering support lifetime of two years, with four scheduled rebuilds. For more information about the Cisco IOS XE Software end-of-life policy and associated support milestones for specific software releases, visit <http://www.cisco.com>.
- **Rebuilds scheduled at regular intervals:** Rebuilds are created only for bug fixes, and no new features are included in a rebuild image. For Standard Support releases, the first rebuild image is released two months after the parent image's first customer shipment (FCS). The second rebuild image is released four months after the parent image's FCS. The Extended Support release provides four scheduled rebuilds. The first two rebuilds are released at two-month intervals after FCS of the affected Cisco IOS XE Software release, and the second two rebuilds are released at four-month intervals thereafter. Releases to correct critical problems (such as those identified by the Cisco Product Security Incident Response Team) are introduced as needed.

## Part Numbers of License Options and Product Activation Keys

Table 3 lists the part numbers of software feature options for Cisco ASR 920 routers.

**Table 3.** Cisco Software Options for ASR 920 Routers

Part Number	Product Name
<b>Feature Set License Options</b>	
ASR920-S-M	Cisco ASR 920 Series - Metro Access
ASR920-S-I	Cisco ASR 920 Series - Metro IP Access
ASR920-S-A	Cisco ASR 920 Series - Advanced Metro IP Access
<b>Feature Set Product Activation Keys</b>	
ASR920-S-M=	Cisco ASR 920 Metro Access Services Paper Product Activation Key (PAK)
L-ASR920-S-M=	Cisco ASR 920 Metro Access Services E-Delivery PAK
ASR920-S-I=	Cisco ASR 920 Metro IP Access Services Paper PAK
L-ASR920-S-I=	Cisco ASR 920 Metro IP Access Services E-Delivery PAK
ASR920-S-A=	Cisco ASR 920 Advanced Metro IP Access Services Paper PAK
L-ASR920-S-A=	Cisco ASR 920 Advanced Metro IP Access Services E-Delivery PAK
<b>Feature Set Upgrade Product Activation Keys</b>	
ASR920-S-M-I=	Cisco ASR 920 Metro Access to Metro IP Access Paper PAK
ASR920-S-M-A=	Cisco ASR 920 Metro Access to Advanced Metro IP Access Paper PAK
ASR920-S-I-A=	Cisco ASR 920 Metro IP to Advanced Metro IP Access Paper PAK
L-ASR920-S-M-I=	Cisco ASR 920 Metro Access to Metro IP Access E-Delivery PAK
L-ASR920-S-M-A=	Cisco ASR 920 Metro Access to Adv Metro IP Access E-Delivery PAK
L-ASR920-S-I-A=	Cisco ASR 920 Metro IP to Advanced Metro IP Access E-Delivery PAK
<b>Feature Licenses</b>	
ASR920-1588	Cisco ASR 920 IEEE 1588-2008 BC/MC License
<b>Port Licenses</b>	
ASR920-1G-6	Cisco ASR920 Series - 6 ports GE license
ASR920-10G-2	Cisco ASR920 Series - 12 ports GE license
ASR920-12G-2-10G	Cisco ASR920 Series - 12 ports GE and 2 ports 10G license
ASR920-24G-4-10G	Cisco ASR 920 Series - 24 ports GE and 4 ports 10G license
ASR920-2G-4-10G	Cisco ASR 920 Series - 2 ports GE and 4 ports 10G license
ASR920-10G-2-10G	Cisco ASR 920 Series - 10 ports GE and 2 ports 10G license
ASR920-12G-4-10G	Cisco ASR 920 Series - 12 ports GE and 4 ports 10G license
FLSASR900-1OC3	ASR 900 1 Port OC3/STM-1 License
<b>Port Licenses Product Activation Keys</b>	
ASR920-1G-6=	Cisco ASR 920 Series - 6 ports GE license Paper PAK
L-ASR920-1G-6=	Cisco ASR 920 Series - 6 ports GE license E-Delivery PAK
ASR920-10G-2=	Cisco ASR 920 Series - 12 ports GE license Paper PAK
L-ASR920-10G-2=	Cisco ASR 920 Series - 12 ports GE license E-Delivery PAK
FLSASR900-1OC3=	ASR 900 1 Port OC3/STM-1 License Paper PAK
L-FLSASR900-1OC3=	ASR 900 1 Port OC3/STM-1 License E-Delivery PAK
<b>Feature Licenses Product Activation Keys</b>	
ASR920-1588=	Cisco ASR 920 IEEE 1588-2008 BC/MC License Paper PAK
L-ASR920-1588=	Cisco ASR 920 IEEE 1588-2008 BC/MC License E-Delivery PAK

## Major Features

Table 4 lists the features supported by Cisco IOS XE in Cisco ASR 920 Series routers. Availability of features is dependent on software release and implementation schedule.

**Table 4.** Cisco ASR 920 Series Router Software Features

Features
<b>Ethernet Services</b>
<ul style="list-style-type: none"><li>• Ethernet Flow Point (EFP) with support for:<ul style="list-style-type: none"><li>◦ 802.1q</li><li>◦ Selective QinQ</li><li>◦ Inner and Outer VLAN classification</li><li>◦ VLAN local significance</li><li>◦ One VLAN tag ingress push</li><li>◦ Pop one VLAN tag</li><li>◦ Pop two VLAN tags</li><li>◦ Trunk-EFP construct for configuration simplification</li></ul></li><li>• IEEE 802.1s Multiple Spanning Tree (MST)</li><li>• Resilient Ethernet Protocol (REP)</li><li>• ITU G.8032</li><li>• 802.3ad/802.1ax Link Aggregation Control Protocol (LACP)</li><li>• Layer 2 Protocol Tunneling (L2PT)</li><li>• VPLS, HVPLS, Virtual Private Wire Service (VPWS), and EoMPLS</li><li>• Pseudowire redundancy</li><li>• Hot Standby Pseudowire</li><li>• Multisegment Pseudowire</li><li>• Dual Rate</li></ul>
<b>Layer 3 and MPLS Services</b>
<ul style="list-style-type: none"><li>• Hot Standby Router Protocol (HSRP)</li><li>• Layer 3 routing on Routed interfaces and Bridge Domain Interfaces (BDI)</li><li>• Cisco Express Forwarding (CEF) load sharing of Equal Cost Paths (ECMP)</li><li>• OSPF</li><li>• BGP</li><li>• BGP 4-byte Autonomous System number (ASN)</li><li>• BGP TCP Path MTU Discovery</li><li>• BGP Prefix-Independent Convergence (PIC) Edge and Core for IPv4 and MPLS VPN</li><li>• IS-IS</li><li>• BFD for OSPF, IS-IS, BGP, and static routes</li><li>• BFD over Ethernet, Routed port interfaces</li><li>• BFD for HSRP group client</li><li>• MPLS</li><li>• LDP with Label Edge Router (LER) and Label Switch Router (LSR)</li><li>• MPLS L3VPN</li><li>• MPLS-TP for Ethernet Pseudo Wires</li><li>• MPLS Traffic Engineering Fast Reroute (TE-FRR)</li><li>• IP Loop Free Alternate Fast Re-Route (LFA FRR)</li><li>• Remote Loop Free Alternate Fast Re-Route (R-LFA FRR)</li></ul>

## Features

### IPv6

- Hardware based IPv6 data forwarding
- Addressing and discovery
- Manual IPv6 interface addressing
- ICMPv6 (RFC 4443)
- IPv4 and IPv6 dual stack
- IPv6 static routing
- OSPF for IPv6 (RFC 5340)
- DHCPv6 with relay function
- BFD for OSPF, IS-IS, BGP and IPv6 static routes
- IPv6 Provider Edge (6PE)
- IPv6 VPN Provider Edge (6VPE)

### QoS

- Modular QoS CLI (MQC)
- Hierarchical QoS (HQoS)
- Port shaper and Low Latency Queuing (LLQ) in the presence of an EFP
- IEEE 802.1p Class of Service (COS) based QoS
- Classification based on inner and outer CoS
- IP Precedence Type of Service (ToS) based QoS
- Differentiated Services Code Point (DSCP) based QoS
- Egress marking of COS, ToS, DSCP and MPLS EXP QoS fields
- Classification using Access Control List (ACL)
- 2-rate 3-color (2R3C) ingress Policing
- Differentiated Services Code Point (DSCP) traffic shaping
- Class-Based Weighted Fair Queuing (CBWFQ)
- Priority Queuing with up to 2 priority queues
- Weighted Random Early Detect (WRED)
- Egress shaping per queue
- Egress policing per queue

### Timing

- IEEE 1588-2008 Ordinary Clock over Ethernet, IP
- IEEE 1588-2008 Boundary Clock over Ethernet, IP
- IEEE 1588-2008 precision time protocol (PTP) telecom profile for frequency synchronization - ITU-T G.8265.1/Y.1365.1
- Hybrid clocking
- Time of Day (ToD), 1 Pulse Per Second (1PPS)
- Building Integrated Timing Supply (BITS)
- ITU-T SyncE with Ethernet Synchronization Messaging Channel (ESMC)
- Synchronization Status Messages (SSM)

### OAM

- IEEE 802.1ag Connectivity Fault Management (CFM) over EFP
- IEEE 802.3ah Link OAM
- MPLS OAM
- ITU-T Y. 1731 Performance Management (PM) over EFP for Delay Measurement (DM) and Synthetic Loss Measurement (SLM)
- Ethernet Local Management Interface (E-LMI), as a provider edge (PE) device

### Security

- Authentication, authorization, and accounting (AAA) with TACACS+ and RADIUS
- Secure Shell (SSH) Protocol v2
- MAC limiting per bridge domain (BD)
- Storm control for Port Mode
- Layer 3 Access Control Lists (ACL) for IPv4 and IPv6
- IPv4 unicast reverse path forwarding (uRPF) strict mode
- MAC security capabilities
- Dynamic Arp Inspection (DAI)
- DHCP Snooping with option 82 insertion
- DHCP Option 82 Configurable Circuit ID and Remote ID

Features
<b>Manageability</b> <ul style="list-style-type: none"> <li>• SNMP</li> <li>• MIBs</li> <li>• Dying Gasp message</li> <li>• Embedded Event Manager (EEM)</li> <li>• Cisco Discovery Protocol (CDP)</li> <li>• 802.1ab Link Layer Discovery Protocol (LLDP)</li> <li>• Port Level Local SPAN (SPAN)</li> <li>• ZTP</li> <li>• Support for Smart Call Home V2 and Cisco Smart Licensing</li> <li>• Cisco IOS Command Line Interface (CLI)</li> <li>• Cisco Prime™ Network: fault, provisioning and performance management</li> </ul>

## Warranty Information

Find warranty information on Cisco.com at the [Product Warranties](#) page.

## Service and Support

Cisco offers a wide range of services programs to help accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, promoting high levels of customer satisfaction. Cisco Services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, refer to Cisco Technical Support Services or Cisco Advanced Services. (<http://www.cisco.com/web/services/portfolio/product-technical-support/index.html>).

Cisco is committed to reducing your total cost of ownership. We offer a portfolio of technical support services to help ensure that Cisco products operate efficiently, remain highly available, and benefit from the most up-to-date system software. The services and support programs described in Table 5 are available as part of the Cisco Carrier Ethernet Switching Service and Support solution and are available directly from Cisco and through Cisco resellers.

**Table 5.** Service and Support

Advanced Services	Features	Benefits
<b>Cisco Total Implementation Solutions (TIS), available directly from Cisco</b> <b>Cisco Packaged TIS, available through resellers</b>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Site survey, configuration, and deployment</li> <li>• Installation, test, and cutover</li> <li>• Training</li> <li>• Major moves, adds, and changes</li> <li>• Design review and product staging</li> </ul>	<ul style="list-style-type: none"> <li>• Supplement existing staff</li> <li>• Help ensure functions meet needs</li> <li>• Mitigate risk</li> </ul>
<b>Cisco SP Base Support and Service Provider-Based Onsite Support, available directly from Cisco</b> <b>Cisco Packaged Service Provider-Based Support, available through resellers</b>	<ul style="list-style-type: none"> <li>• 24-hour access to software updates</li> <li>• Web access to technical repositories</li> <li>• Telephone support through the Cisco Technical Assistance Center (TAC)</li> <li>• Advance Replacement of hardware parts</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate proactive or expedited problem resolution</li> <li>• Lower total cost of ownership by taking advantage of Cisco expertise and knowledge</li> <li>• Reduce network downtime</li> </ul>




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